

A REVISION OF THE MANGROVE VIREO
(*VIREO PALLENS*) (AVES: VIREONIDAE)

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ABSTRACT

The Mangrove Vireo (*Vireo pallens*) is divisible into two allopatric sets of subspecies, Caribbean and Pacific, which may eventually prove to be separate species. Geographic variation among the Caribbean populations, which are not confined to mangroves, has been misunderstood because previous authors did not realize that these populations have two color phases, yellow and gray. Three Caribbean subspecies are recognized here: *V. p. salvini* of most of the Yucatán Peninsula and adjacent islands; *V. p. semiflavus* of southernmost Campeche, southernmost Quintana Roo, Belize, Guatemala, and Honduras; and *V. p. angulensis*, new subspecies, of the Bay Islands of Honduras. Specimens of the Pacific populations, which appear to lack color phases and to be confined to mangroves, are rare in collections; available material permits recognition of *V. p. ochraceus* (with *paluster* Moore as a synonym) of Pacific mangroves from Sonora to El Salvador; *V. p. pallens* of Honduras and Nicaragua; and *V. p. nicoyensis*, subsp. nov., of the Peninsula and Gulf of Nicoya, Costa Rica. Iris color is apparently exceptionally variable in this species, but nothing is known about iris color changes with age or season.

INTRODUCTION

Within a group of tropical vireos allied to the North American White-eyed Vireo (*Vireo griseus*), the treatment of species limits has varied. In two standard reference works, Blake (1968) recognized as full species *Vireo griseus*, *crassirostris*, *gundlachii*, *modestus*, and *pallens*, whereas Hellmayr (1935) combined all of these into the species *Vireo griseus*. Two additional insular forms, *V. bairdi* of Cozumel Island, Mexico, and *V. caribaeus* of Isla San Andrés, Colombia (described subsequent to Hellmayr), were thought by Blake (1968) to belong to this same group. In the only detailed study of *V. caribaeus* (Barlow and Nash, 1985), the authors were unable to determine its relationships other than its membership in the subgenus *Vireo*, of which *V. griseus* is the type species. Bond (1986), after citing the Barlow and Nash paper, postulated that *V. caribaeus* "was derived from Central America of *V. pallens* stock." He stated that its "vocalizations are similar to those of *V. pallens semiflavus* on Isla Utila, Honduras." Barlow and Nash, however, had described three distinct song types for *caribaeus*, one of which was stated apparently to resemble that of Isla Utila *pallens*, based on an earlier statement by Bond (1950). The three song types listed for *V. caribaeus* by Barlow and Nash were described as resembling those of (1) among others, "most populations" of *V. pallens* (their descriptions of this song type matches the songs I have heard from *V. pallens* on the Yucatán Peninsula); (2) *V. crassirostris approximans* of Isla Providencia and, on the authority of Bond (1950), the Isla Utila population of *V. pallens*; (3) other "white-eyed" type vireos, inferentially including *V. griseus*. Bond (1950), however, had described the songs of *V. caribaeus* and Isla Utila *V. pallens* as being similar to that of *V. griseus* (i.e. type 3 of Barlow and Nash). Clearly there is a discrepancy here. As the color plate accompanying the Barlow and Nash paper indicates, *V. caribaeus* does closely resemble some populations of *V. pallens*, but all members of this subgenus look much alike. Until more than

just subjective impressions of comparative vocalizations are available, it is premature to submerge *V. caribaeus* into *V. pallens*, as Bond went on to do in a later paper (1987).

Several museum collections contain specimens from within the range of *V. pallens* labeled by Allan R. Phillips as "*Vireo gundlachii*." Although these taxa are also closely similar, combining them is also premature, and has caused confusion among curators unfamiliar with vireo taxonomy.

The present paper concerns the populations of Mexico and Central America placed by Blake in *Vireo pallens*, and for the time being this status will be accepted. There are two allopatric groups of subspecies, Pacific and Caribbean, and it is possible that future field studies, especially of vocalizations, may indicate that recognition of two species, *V. pallens* and *V. semiflavus*, respectively, is warranted. Examination of an excellent series of 148 specimens, assembled from several museums, indicates that the subspecific division advocated by Blake does not adequately correspond with the geographic variation in this species. For explanation of museum acronyms used in the text, see Acknowledgments, beyond.

CARIBBEAN POPULATIONS

Blake (1968) admitted only one Caribbean subspecies, *Vireo pallens semiflavus* Salvin, with type locality Sakluk [=La Libertad], Petén, Guatemala, and a range described as "Caribbean lowlands from Yucatán Peninsula and adjacent islands south to Honduras, the Bay Islands, and Nicaragua." As a synonym of *semiflavus*, he listed *V. p. salvini* van Rossem, 1934, described from Holbox Island, "Yucatan" [=Quintana Roo], considered by its author to be confined to "Islands of the northern coast of Yucatan, from Progreso to Holbox Island." It was described as differing from *semiflavus* in being more olive gray, less grayish green above, and creamy rather than yellow below.

Examination of any large series of Caribbean specimens of this species reveals a fairly conspicuous variation in color, especially of the underparts. Griscom (1932:319) stated, in his usual dogmatic phraseology, "As is now well known, young birds of this species are quite different in appearance from adults, being grayer, less green above, and whiter, less yellow below." Hellmayr (1935:117, 118 [footnotes]) was of the same opinion. Van Rossem (1934), however, stated that although the two color extremes mentioned by Griscom were apparent in the British Museum (Natural History) series of *semiflavus*, he was "skeptical about age or sex being responsible."

During field work by the writer, Allan R. Phillips, and Robert W. Dickerman on the Yucatán Peninsula in 1963 and 1965, special attention was paid to this species. The label annotations on cranial pneumatization of the specimens collected during these expeditions clearly demonstrate that the first basic plumage of this species does not differ in color from that of older birds, nor do the sexes differ in color. The true juvenal plumage is indeed paler than later plumages, but is not the plumage referred to by Hellmayr (1935:118, footnote) as "juvenile"; specimens in the ephemeral juvenal plumage are absent from most museum collections.

What, then, is the explanation for the presence in the series of the grayish and greenish extremes in dorsal coloration (corresponding to paler and richer yellow underparts)? The answer is obvious upon examination of a series of the closely related (and possibly conspecific) *Vireo crassirostris* of the Bahamas. Todd (in Todd and Worthington, 1911:428-430), in a detailed discussion, showed that

color variation in *V. crassirostris* was best explained as color phases, partially geographically correlated. He went on to state that “a *precisely parallel variation* [italics his] obtains in at least two closely allied continental species of this genus, *Vireo ochraceus* [= *pallens*] and *Vireo carmioli*.” This statement was overlooked by all subsequent authors, possibly because Todd did not elaborate on the supposed color phases in the two mainland species. His unpublished notes on file in The Carnegie Museum of Natural History (CM), however, include the perceptive observation, based on a series from Belize, that “The evidence goes to show that this species has both a dull and bright phase of plumage, probably independent of sex, age, or season . . .” In *V. crassirostris*, the color phases tend to be much more geographically correlated than in *V. pallens*; in both cases the color phases misled early authors into describing subspecies.

Allan R. Phillips (*in litt.*) pointed out to me that Yucatán specimens of *V. pallens* have the tiny feathers of the lower eyelid pale yellow, whereas these feathers in specimens from Caribbean Guatemala and elsewhere in Central America are of the darker color of the rest of the face. This character appears to be quite reliable when specimens in the yellower color phase are compared; specimens in the grayer phase are harder to separate. Using this and other color characters and comparing only color phase to similar color phase, the Caribbean populations segregate out into three subspecies. For convenience, the color phases will be called “gray” (G) and “yellow” (Y), although this is an oversimplification.

In two populations the Y birds lack the pale feathers of the lower eyelid, such feathers being of the dark color of most of the rest of the face (the lores and a variable spot above the eye are some shade of yellow). These populations are: (1) that of Central America, of which material was examined from southernmost Quintana Roo (on the Belize border), the pine forests of Belize, extreme southern inland Campeche near the border of Petén, Guatemala, and Petén itself (including the type locality of *semiflavus* Salvin); (2) the population of the Bay Islands of Honduras, hitherto considered to be of the same subspecies as the mainland population.

The population with pale lower eyelid feathers, varying from yellow to almost white, is confined to the Yucatán Peninsula and smaller adjacent islands, south at least to Chetumal, Quintana Roo. It is likely that the birds of very northernmost Belize (across the Río Hondo from Chetumal), from which no specimens were examined, belong to this subspecies as well. However, a single specimen from Agua Blanca, southernmost Quintana Roo (YPM 8887), is *semiflavus*; this locality is also on the Mexican side of the Río Hondo, nearly 100 km upstream (southwest) from Chetumal, and the population on the Belize side would probably be similar.

The name *salvini* van Rossem (1934) must be used for these peninsular vireos, although van Rossem’s concept of his supposed new race was erroneous. He described it as a less yellow coastal race, contrasting it with the bright yellow *semiflavus* of the interior. However, his description of *salvini* applies to the gray phase only; the coastal population also has a yellow phase, and both have been collected on the same day on the Yucatán coast. Furthermore, CM 142010, male Y and 142011, female G, collected by the author on 16 January 1965 on Isla Mujeres, Quintana Roo, were noted in the field as probably being a mated pair.

The differences between *semiflavus* and *salvini* as redefined here are: in the Y phase, the feathers of the lower eyelid of *salvini* are pale (yellow to almost white) as opposed to the dull greenish color in *semiflavus*; the underparts of *salvini* are richer yellow, with the under tail coverts and lesser under wing coverts distinctly

yellow (paler, to yellowish white in *semiflavus*); and the upperparts are somewhat brighter, less grayish green in unworn specimens. It is important to note that in the Y phase, the true characters of *salvini* are the *reverse* of those claimed by van Rossem. In the G phase, on the other hand, the underparts of *semiflavus* are distinctly whiter than those of *salvini*; dorsally *semiflavus* is browner, less greenish, but the differences here are quickly obscured by wear.

Specimens collected in early stages of the first prebasic molt indicate that the color phases are present even in juvenal plumage: *semiflavus* (Y), USNM 302716, La Libertad, Petén; (G), CM 24830, near Manatee Lagoon, Belize: *salvini* (Y), YPM 12808 and (G), 12809, both from Santa Clara, Yucatán (same date, possibly from same brood).

Monroe (1968) stated that in series, specimens of *Vireo pallens* from the Bay Islands of Honduras "average slightly less yellowish below than those from British Honduras [=Belize] and Yucatan . . . These differences are slight and subject to much individual variation; they are not sufficient to warrant taxonomic recognition [as separable from *semiflavus*]." The "individual variation" is easily explained by the fact that his "*semiflavus*" series was a composite of *semiflavus* and *salvini*, and that he did not segregate the specimens by color phase. When the subspecies and color phases have been sorted out, it is apparent that the Bay Islands populations are indeed worthy of subspecific recognition.

Vireo pallens angulensis, new subspecies

Holotype.—CM 131499, adult male, collected at French Harbor, Isla Roatan, Bay Islands, Honduras, 3 April 1947, by A. C. Twomey (field no. 11918).

Diagnosis.—Differs in the Y phase from *salvini* of Yucatán in having the feathers of the lower eyelid dark rather than pale like those of the upper eyelid. Differs from *semiflavus* of Caribbean mainland Central America in having the dorsal color of the Y phase yellower and of the G phase greener. Differs from both of the other races in having a distinct ochraceous wash on the face and flanks; it is difficult to match, but is approximately between Cinnamon (123A) and Clay Color (123B) of Smithe (1981); this might be considered an approach to the unique Tawny (38 of Smithe, 1975) of the closely related *V. bairdi* of Isla Cozumel. The underparts of the gray phase of *angulensis* are the yellowest of the three races; in the yellow phase, the underparts are intermediate in the intensity of yellow between *semiflavus* (paler) and *salvini* (richer). There are no measurement differences among the Caribbean populations.

Range.—Confined to the Bay Islands of Honduras (Islas Roatan, Barbareta, Utila, and Guanaja [Bonacca]). Monroe (1968) specifically excluded Isla Guanaja from the range of this species, but territorial males were found on Henry Cay and Northeast Cay, satellite coral islands of Isla Guanaja, on 3 July 1971 (Udvardy, 1976).

Etymology.—The name is taken from Latin *angulus*, a word with many meanings among which are bay or gulf, in reference to the subspecies range in the Bay Islands.

Remarks.—As suggested by Monroe, there are slight differences among specimens of *angulensis* from island to island. He regarded those from Isla Utila as the grayest; I found no difference between those of Utila and Roatan, whereas those of Barbareta were slightly deeper yellow on the underparts.

As the status of *salvini* (in that it has color phases) has been misunderstood in the past, an expanded comparison with the corresponding phases of the other

racess is in order. In the G phase *salvini* is nearest *semiflavus* in dorsal color, but slightly paler, and has the rump and upper tail coverts uniform with the back, whereas the *semiflavus* these areas are more greenish than the back. In the Y phase, *salvini* is nearest *angulensis* dorsally, but greener, less yellowish.

In ventral coloration, the progression of increasing saturation with yellow is: *semiflavus* (G), *salvini*(G), *angulensis* (G), *semiflavus* (Y), *angulensis* (Y), *salvini* (Y). One can deduce from this sequence that the contrast between gray and yellow phases is greatest in *salvini*, which a glance at the museum tray immediately confirms. It is least in *semiflavus*, in which (especially in very worn specimens) some individuals are difficult to assign to a color phase.

The color phases of the related *Vireo crassirostris* are strongly but not completely correlated with geography within the Bahamas (Buden, 1985; personal examination of specimens). In Caribbean populations of *V. pallens* the correlation is weaker. In the series examined, among specimens not too worn to evaluate, the color phases break down as follows: *semiflavus* (Petén, Belize, and southernmost interior Campeche), 17 Y, 8 G; *salvini* (Yucatán Peninsula except as above), 42 Y, 17 G; *angulensis* (by islands), Isla Roatan 7 Y, 0 G; Isla Barbareta, 8 Y, 2 G; Isla Utila, 4 Y, 3 G. It is evident that throughout the Caribbean range, the gray color phase is in the minority. The high proportion of gray specimens from Isla Utila and the absence of gray specimens from Isla Roatan may be artifacts of small sample size.

Although generally known in the literature as "Mangrove Vireo," *Vireo pallens* in the Caribbean portion of its range is by no means confined to this habitat. All but one of a series of Belize specimens in CM collected by Morton E. Peck are labeled "Pine Ridge near Manatee Lagoon"; this is an open pine savannah (D. S. Wood, personal communication). For Belize, Russell (1964) mentioned, in addition to mangroves, "lagoon borders, thickets, and low huamil [=second growth forest]." In our own field work on the Yucatán Peninsula, we found *V. pallens* commonest along the coast, in or near mangroves, but also in hedgerows and old fields.

Only one specimen examined, CM 27672, appears to be an intergrade between *semiflavus* and *salvini*. It was labeled by Peck simply as "seaside, B[ritish] H[onduras] [=Belize]." Other specimens collected the same day (20 February 1906) are labeled "Forest near Manatee Lagoon," so CM 27672 was presumably collected along the seaside east of Manatee Lagoon proper. All of the other CM Belize specimens examined were from localities near but not actually on the coast (All Pines, Freetown). It is possible that the true mangrove population in Belize shows a genetic connection with Yucatán *salvini*, as suggested by the one "seaside" specimen.

PACIFIC POPULATIONS

In his revision of this species, van Rossem (1934) characterized the Pacific forms as differing from the Caribbean forms in having longer wings ("averaging about 57 mm." vs. "averaging 53 mm.") and longer "spurious" (=10th) primaries ("about 21 mm." vs. "17 mm."). In his original descriptions of *V. pallens* (Pacific), *V. ochraceus* (Pacific), and *V. semiflavus* (Caribbean), Salvin (1863) gave their respective 10th primary measurements as 0.93 in (23.6 mm), 0.85 in (21.6 mm), and 0.65 in (16.5 mm). Neither van Rossem nor Salvin indicated either the size of their series or their method of measuring the 10th primary.

It is true that Pacific specimens average longer winged than those of the Carib-

Table 1. — Measurements (in mm) of *Vireo pallens* and ratio of primary 10 length to wing length: N, number; M, mean; R, range; SD, standard deviation.

Sample (sexes combined)	Wing (flat)			Primary 10			Primary 10/wing			Bill from nostril						
	N	R	M	SD	N	R	M	SD	N	R	M	SD				
<i>salvini</i>	17	53.5–58.0	(55.9)	1.357	10	17.5–20.0	(19.2)	0.914	10	0.313–0.374	(0.341)	0.018	17	7.5–9.0	(8.0)	0.450
<i>semiflavus</i>	19	54.5–59.0	(56.4)	1.393	10	17.0–21.0	(19.5)	1.155	10	0.301–0.367	(0.342)	0.018	19	7.5–9.0	(8.2)	0.419
<i>angulensis</i>	24	53.5–58.5	(56.2)	1.390	10	18.5–21.5	(20.0)	0.745	10	0.325–0.371	(0.356)	0.013	23	7.5–9.0	(8.2)	0.328
“ <i>paluster</i> ”	6	57.0–61.5	(58.8)	1.915	6	18.5–22.0	(19.9)	1.158	6	0.319–0.358	(0.339)	0.014	7	8.5–9.5	(9.0)	0.500
<i>ochraceus</i>	16	57.0–61.5	(59.0)	1.284	16	18.0–22.0	(20.5)	1.080	16	0.303–0.377	(0.348)	0.201	14	8.5–9.5	(8.6)	0.306
<i>pallens</i>	4	59.0–59.5	(59.3)	0.289	4	19.5–22.0	(20.6)	1.031	4	0.328–0.370	(0.348)	0.017	5	all 8.5		
<i>nicoyensis</i>	8	56.0–60.0	(58.1)	1.321	8	18.0–20.5	(19.1)	0.916	8	0.305–0.354	(0.329)	0.017	8	8.0–9.0	(8.5)	0.378

bean, although not as much as stated by van Rossem. He found a difference between the means of his Pacific and Caribbean samples of about 4 mm. I found no statistically significant differences (t-tests of the difference between 2 means, $P > 0.05$) among the subspecific subsets of either my Pacific or Caribbean samples, and therefore pooled subsets into two sets of measurements, total Pacific and total Caribbean. In my wing length samples, much larger than those of van Rossem (Pacific, $N = 31$; Caribbean, $N = 62$), the means differed by only 2.6 mm, but this is nevertheless statistically significant (t-test, $P < 0.001$).

In my measurements of the 10th primary (tip of the feather to the tip of the coverts at the base, along the outer edge), although the means of the pooled Pacific and Caribbean samples differ by only 0.69 mm, this difference too is statistically significant (t-test, $P < 0.02$). The question then must be asked: is the longer 10th primary of the Pacific population simply a function of the longer wing of that population? The mean wing length of the Pacific sample was 4.6% larger than that of the Caribbean, and the mean 10th primary length of the Pacific sample was 3.5% larger than that of the Caribbean. Given the coarseness of the measurements (taken only to the nearest 0.5 mm), the closeness of these percentages strongly suggests that the Pacific populations do not differ in *relative* length of the 10th primary from those of the Caribbean; the difference in 10th primary lengths, even if real, is actually slightly in the direction *away* from what would be true if that primary were indeed relatively longer in Pacific birds.

The sexes were combined for all measurements mentioned above, as these and other series of measurements indicate that there is no size difference between the sexes in this species.

Blake (1968) admitted three Pacific subspecies of *Vireo pallens*: *paluster* Moore (type locality Isla Las Tunas, northwestern Sinaloa, Mexico), with a range given as "Mangrove swamps on Pacific coast of Mexico from extreme southwestern Sonora (Masochari Island) south to Nayarit"; *ochraceus* Salvin (type locality San José, Guatemala), with a range given as "Mangrove swamps along Pacific coast of Guatemala and El Salvador, east to Puerto El Triunfo"; and nominate *pallens* Salvin (type locality restricted to Realejo, Nicaragua by van Rossem [1934]), with a range given as "Mangrove swamps on Pacific coast of Central America from extreme eastern El Salvador (?) and Honduras south to Costa Rica." The query in the range of *pallens* is based on Dickey and van Rossem's claim (1938) that both *ochraceus* and *pallens* had been taken at Puerto El Triunfo, El Salvador.

Specimens of the Pacific populations are much scarcer in collections than those of the Caribbean—only 38 were assembled for this study, as opposed to 110 from the Caribbean side (two additional specimens from San Blas, Nayarit, were examined in the Cornell University collection). This limited series, however, suffices to show that it is highly improbable that the Pacific populations have color phases. It is also clear from the limited literature of the Pacific forms and habitat notes on specimen labels that these are indeed true Mangrove Vireos, being completely confined to the mangrove swamp habitat.

Moore (1938), in his description of *V. p. paluster*, claimed that it was "duller, more brownish yellow below, grayer (less greenish) above" than *ochraceus* of Guatemala. His series contained only three specimens; I have seen the two paratypes, and the holotype was collected only one day earlier than the topotypical paratype at hand. *All* of these specimens (taken 1862–1938) are worn and faded. Two topotypes in the Moore Collection taken after the description of *paluster* are also worn. Comparison with old (1905–1927) topotypical specimens of *ochraceus*

from San José, Guatemala, shows no perceptible color differences. Even more persuasive is the comparison of more recently taken specimens, two (1959) from San Blas, Nayarit (DMNH 32187, 32188), which should be *paluster*, with two (1966) *ochraceus* from Acapetagua, southeastern Chiapas (DMNH 32184, 32185; a range extension) and two (1970, 1973) from Guatemala (AMNH 813701, 813699), mostly in relatively unworn plumage. These show that there is no color difference between “*paluster*” and *ochraceus*; if anything, the Nayarit birds are *brighter* rather than duller yellow below.

The other character claimed by Moore for “*paluster*” was a bill longer and deeper than that of *ochraceus*. I examined a longer series than was available to Moore, but measured the bill from the anterior edge of the nostril, a more precise measurement than Moore’s “exposed culmen.” Measurements of subsamples of “*paluster*,” of *ochraceus* from Guatemala and Chiapas, and of *ochraceus* from El Salvador did not differ significantly from one another, nor did “*paluster*” differ from pooled samples of *ochraceus*. I did not measure bill depth, but visual inspection clearly shows this character to be variable in both series. In spite of the long apparent hiatus between their ranges, there are thus no trenchant characters to warrant the recognition of *paluster*, which I consider to be a synonym of *ochraceus*.

The distribution of mangroves on the Pacific coast of Mexico is highly disjunct. It is not clear whether the apparent absence of *Vireo pallens* between Nayarit and Chiapas is an artifact of insufficient collecting, as mangrove swamps tend to be uncomfortable and difficult habitats in which to collect. Many mangrove swamp specimens of this and other species have been collected where a road parallels or even transects the mangroves, but in general, access to much of the mangrove habitat is difficult. The habitat map of Oaxaca published by Binford (1989) shows several small patches of mangroves along the coast of that state, and extensive stretches bordering Laguna Superior, Laguna Inferior, and Mar Muerto in the southeasternmost corner. Binford’s map of collecting localities suggests that little field work has been done in these areas, and it is thus perhaps not surprising that Binford’s monograph does not list *Vireo pallens* for Oaxaca, although he did report the equally obligate mangrove dweller *Dendroica petechia rhizophorae*. Steve Howell (personal communication), however, has unpublished sight records for this species on the Oaxaca coast.

Concerning the distribution of the races *ochraceus* and *pallens*, Dickey and van Rossem (1938) claimed that both occurred at Puerto el Triunfo, in easternmost El Salvador. A series from Barra de Santiago, farther west in El Salvador, they considered to be uniformly *ochraceus*. However, the supposed “*pallens*” specimen from Puerto el Triunfo (UCLA Dickey Collection 16920) is inseparable in ventral coloration from one of the Barra de Santiago series (UCLA 18666), and is only faintly grayer dorsally. It is best considered as an intergrade toward *pallens* of the Pacific coast of Honduras and Nicaragua. The type locality of *pallens*, *contra* Hellmayr, 1935, is “Realejo,” Nicaragua, as restricted by van Rossem, 1934; see also Warren and Harrison, 1971 (in the latter, the reference to Salvin 1866 should read p. 193, not p. 93). Deignan (1961) erroneously identified “Realejo” as equivalent to Chichigalpa of modern maps, but this is not a coastal locality. Salvin and Godman (1882) clearly stated the “Realejo” was “now called Corinto,” which is indeed a coastal locality. Both Corinto and El Realejo appear on sheet ND16 of the American Geographical Society Map of Hispanic America, the former at the mouth and the latter at the head of a small bay near the mouth of the Río Cosinapa. Three specimens from Corinto (AMNH) have been available during this study.

As van Rossem correctly stated, *pallens* is more olive-gray dorsally than *ochraceus*, and is cream-colored rather than yellow below.

There is an isolated population of this species in the mangroves from the Pacific side of the Nicoya Peninsula and both sides of the Gulf of Nicoya in Costa Rica (see Specimens Examined for localities), where it is uncommon (Slud, 1964). This population has previously been included in nominate *pallens*, and, in fact, a specimen in the British Museum (Natural History) from Puntarenas (85.3.10.107) is a paratype of *pallens*. It is the specimen figured as *pallens* by Salvin and Godman (1882: plate XII, fig. 2), but as these authors state, "the figure is rather too highly colored." These Costa Rican specimens represent an isolated population exhibiting the extreme of reduction of xanthic pigments within the species. This population, although represented by few specimens in museum collections, is clearly worthy of nomenclatural separation.

Vireo pallens nicoyensis, new subspecies

Holotype.—USNM 198526, adult male, collected at Pigres, east coast of the Gulf of Nicoya, Province of Puntarenas, Costa Rica, 2 March 1905, by Robert Ridgway.

Diagnosis.—Nearest *pallens* of Pacific Honduras and Nicaragua, but much paler ventrally, with the throat and abdomen almost pure white; ventral pigmentation consists only of a wash of pale cream color, principally across the breast. Dorsum and edgings of remiges and rectrices decidedly grayer, less greenish than in *pallens*.

Range.—Apparently confined to mangroves on the Pacific coast of the Nicoya Peninsula and both coasts of the Gulf of Nicoya, Costa Rica.

Etymology.—The name is taken from the only known range of the subspecies.

Remarks.—I would have preferred to use a more recently collected specimen as the holotype, but the six that I have seen, which were taken 1975–1985 (WFVZ 31945, 34410; MZUCR 1425, 3081, 3164, 3167) are in mostly worn plumage; collection dates range from late April to late August. The March holotype and a February topotypical paratype are in fresh unworn plumage. A March specimen from Puntarenas in the Museo Nacional de Costa Rica collected by Alfaro and Cherrie in 1889 is unfortunately badly stained, but as far as can be determined, the underparts were whitish as in the other specimens.

The only specimen seen from the Pacific side of the Nicoya Peninsula, MZUCR 3081 (Playa Carrillo, 28 April 1985), is inseparable from those of the Gulf of Nicoya and shows no sign of intergradation in color with *pallens* of the Nicaragua coast.

NOTES ON IRIS COLOR

Because of the apparent relationship of *Vireo pallens* to the white-eyed *Vireo griseus*, we paid special attention to recording iris color of the specimens we collected on the Yucatán Peninsula in 1963 and 1965, and several other specimens in the series examined have similar notations. This species is remarkably variable in iris color, which may well change with age, as it does with other vireos. Unfortunately there are very few specimens with label annotations indicating incomplete pneumatization of the cranium; many of the specimens that are labelled as having fully pneumatized crania were taken too late in the year for this to have any significance for aging. So far there are no characters known that will distinguish the first basic from later plumages. Two specimens in the following list are given as "imm." based on label notations, and one specimen is in full juvenal plumage. The colors in the following list are quoted directly from labels.

Vireo pallens salvini

January: males, light brownish to straw yellow; brown, slightly grayish; grayish brown (*not* brownish gray). February: males, medium gray, brown toward center (2). April: male, white. May: male, straw yellow to light brown. June: male, gray. November: males, brown (2 adults, 1 immature); grayish brown. Female, medium brown. December: males, gray (3).

Vireo pallens semiflavus

January: male, very pale gray speckled with brown. February: male (?), brownish gray. June: males, white (2). October: male, gray. Female, light grayish brown. November: males, brownish gray, paler and grayer peripherally (also 1 unsexed, same color); brown (narrowly whitish peripherally). Female, mostly or wholly brown. No date: male, light brown. Female, light brown. Unsexed juvenile, dark.

In addition, D. Scott Wood recorded the iris color of two males mist-netted in Belize 2 July 1985, using the Munsell color notation, as outer ring 5YR, 4/3, inner ring 5YR, 6/3, and outer ring 5YR, 4/4, inner ring 5YR, 7/2.

Vireo pallens angulensis

No iris color annotations.

Vireo pallens "paluster"

April: male, rather pale brown, white-rimmed peripherally. Female, whitish, speckled with grayish brown except peripherally (effect pale brownish gray).

Vireo pallens ochraceus

January: male, dull yellow. Female, dull yellow. February: male, dull yellow.

Vireo pallens pallens

January: male, pale brownish gray. Female, stone gray. September: immature male, brown.

Vireo pallens nicoyensis

March: female, white. April: male, light brown. May: male, pale yellow. Female, light brown. August: male (adult), light brown; light gray-buff. Female (adult), brownish gray.

From this list, it is clear that *most* individuals of this species have irides of some shade of brown or gray, but the exceptions are interesting. Austin Paul Smith recorded three Guatemala specimens of *ochraceus* as having dull yellow irides; these and one of the seven annotated specimens of *nicoyensis* are the only specimens in which the iris is given unequivocally as some shade of yellow. Four specimens, an April male of *salvini*, two June males of *semiflavus*, and a March female of *nicoyensis*, were recorded as "white," indicating that this species at least occasionally attains the iris color of adults of the related *V. griseus*. Except for the small yellow-eyed sample of *ochraceus*, there is no apparent correlation between iris color and geography; the colors given for the other Pacific specimens can be matched among the Caribbean series, allowing for differences in color vocabulary among the collectors (the most meticulously detailed annotations having been made by Allan R. Phillips). The significance of iris color variation in this species might be clarified to some extent if more

specimens could be collected and their iris colors recorded during the period when the birds can be aged by cranial pneumatization, and if diagnostic plumage characters could be found among such known-aged specimens so that first-year birds could be so identified after their cranial pneumatization had been completed. Additionally, series of adults of several populations taken throughout the year at a single locality each would indicate whether there is any seasonal variation in iris color. Only 44, or 30% of the specimens examined, had iris color notations; I urge future collectors to be sure to add this information to their label data.

SPECIMENS EXAMINED

(Eleven additional specimens examined at Cornell University, but direct comparisons not made with these.)

Vireo pallens salvini: Coastal Yucatán, 15; Isla Mujeres, 8; Isla Holbox, 2; northeasternmost Quintana Roo, 3; interior of Yucatán and Quintana Roo, 6; Chetumal, SE Quintana Roo, 8; Isla del Carmen, Campeche, 5; coastal Campeche, 5; 9–12 km E of Ciudad Campeche, 6.

Vireo pallens salvini × *semiflavus*: Belize, 1.

Vireo pallens semiflavus: Southern interior Campeche, 2; Guatemala, 5; southernmost Quintana Roo, 1; Belize, 19.

Vireo pallens angulensis: Isla Roatan, 7; Isla Utila, 7; Isla Barbareta, 10.

Vireo pallens ochraceus (including "*paluster*"): Sonora, 2; Sinaloa, 3; Nayarit, 2; Chiapas, 2; Guatemala, 8; El Salvador, 6.

Vireo pallens ochraceus × *pallens*: El Salvador, 1.

Vireo pallens pallens: Honduras, 2; Nicaragua, 3.

Vireo pallens nicoyensis: Costa Rica, 9.

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